

**TAXONOMIC STATUS OF THE MALTESE WALL LIZARD (*PODARCIS FILFOLENSIS*, BEDRIAGA 1876)****C. Savona-Ventura<sup>1</sup>****ABSTRACT**

The Maltese-Pelagian area is characterised by an endemic species of Wall Lizard - *Podarcis filfolensis*. This has differentiated into various subspecies on the various islands and rocks of the region including ssp. *filfolensis* on Filfolia, *laurentiimuelleri* of Lampione and Linosa, *generalensis* of Fungus Rock, *kieselbachi* of St. Paul's Islands, *maltensis* of Malta and Gozo and possibly Comino, and an unnamed form from Cominotto. The taxonomical status of the species and its possible origins from *Podarcis sicula* are reviewed in the light of the geological movements which occurred in the Central Mediterranean during the Pleistocene. The colour differences between the various subspecies are reviewed and four degrees of melanism are proposed.

**INTRODUCTION**

The systematics of the Lacertidae, particularly of some genera such as *Podarcis* Wagler, 1830 seem to be undergoing rapid evolutionary differentiation. The late 19<sup>th</sup> century arrangement of European lizards was incredibly confused. It was only Mehely (1909) who demonstrated beyond the shadow of doubt that most of the previously described *Lacerta muralis* "varieties" were sometimes phylogenetically rather distant species. One Lacertidae species which suffered from the confusion in taxonomy was the Wall Lizard which inhabited the Maltese-Pelagian area in the Central Mediterranean. This lizard has eventually been defined as a full species - *Podarcis filfolensis* Bedriaga, 1876 with several subspecies and colour forms inhabiting the various islands and islets of the area.

The Maltese-Pelagian area comprises several small islands and rocks (Fig. 1). The Maltese Islands are a group of small low islands aligned in a NW-SE direction and located in the central Mediterranean at latitude 35°48'28" - 36°05'00" North and longitude 14°11'04" - 14°34'37" East. The islands are situated on a shallow shelf, the Malta-Ragusa Rise, part of a submarine ridge which extends from the Ragusa peninsula of Sicily southwards to the African coasts. Geophysically, the Maltese Islands and the Hyblean Plateau of south-eastern Sicily are generally regarded as forming part of the African continental plate. The Maltese archipelago consists of three inhabited islands: Malta (area 245.7 km<sup>2</sup>), Gozo (67.1 km<sup>2</sup>) and Comino (2.8 km<sup>2</sup>), and a number of small uninhabited islets: Cominotto (9.9 ha), Filfolia (2.0 ha), St Paul's Islands (10.1 ha) and General's or Fungus Rock (0.7 ha), and a few other minor rocks. The Pelagian Islands lie about 150 km to the south-west of the Maltese archipelago and include Lampedusa, Linosa, Lampione

and Conigli Island. The biota of the Maltese-Pelagian islands are considered to be of the euro-mediterranean type, with close affinities to that of Sicily (Corti & Lanza, 1973). The region also supports a number of endemic species. The herpetofauna of the Maltese-Pelagian islands is rather restricted and includes a number of introduced naturalised species. The species pertaining to the family Lacertidae include the endemic *Podarcis filfolensis* Bedriaga with its various subspecies described from the islands of the Maltese archipelago and the Pelagian Islands of Lampione and Linosa, and *Psammodromus algirus algirus* on Conigli Island (Table 1).

**TAXONOMY**

The Maltese-Pelagian species *Podarcis filfolensis* has been described as having close affinities to the Sicilian *P. wagleriana* Gistel, 1868 and a superficial resemblance to the Tirrenian *P. tiliguerta* Gmelin, 1784 (Boulenger, 191; Klemmer, 1957). The similarity to *P. tiliguerta* is probably more due to convergence rather than a genetic relationship; and paleogeographic and immunological evidence suggests that *Podarcis filfolensis* and *P. wagleriana* almost surely arose from common Sicilian stock - *P. sicula* Rafinesque, 1810 (Lanza *et al.*, 1977; Lanza & Cei, 1977). Immunological reactions have confirmed that *Podarcis sicula* and *P. muralis* are two full different species, while *P. tiliguerta* may be a subspecies of *P. muralis*. The lizards of the Sicilian-Maltese-Pelagian area - *Podarcis filfolensis* and *P. wagleriana* - have been shown to be two separate but allopatric and morphologically closely related species with a close relationship to *P. sicula* but not to *P. tiliguerta* (Lanza *et al.*, 1977; Lanza & Cei, 1977). Studies on the electrophoretic variation of 26 presumptive gene loci of the

<sup>1</sup> Institute of Health Care, University of Malta, Gwardamangia, Malta

**TABLE 1: Herpetofauna of the Maltese-Pelagian Islands**

(1: Malta; 2: Gozo; 3: Comino; 4: Filfolia; 5: St. Paul's Islands; 6: Cominotto; 7: General's Rock; 8: Linosa; 9: Lampedusa; 10: Conigli Island; 11: Lampione; 12: Pantelleria)

HERPETOFAUNAL SPECIES	MALTESE ISLANDS							PELAGIAN ISLANDS				
	1	2	3	4	5	6	7	8	9	10	11	12
AMPHIBIA												
<i>Bufo viridis viridis</i>									+			
<i>Discoglossus pictus pictus</i>	+	+										
REPTILIA - TESTUDINAE												
<i>Testudo hermanni</i>								+	+			+
REPTILIA - GEKKONIDAE												
<i>Tarentola mauritanica mauritanica</i>	+	+	+	+		+		+	+	+		+
<i>Hemidactylus turcicus turcicus</i>	+	+	+	+	+	+		+	+			+
REPTILIA - LACERTIDAE												
<i>Podarcis filfolensis</i>	+	+	+	+	+	+	+	+			+	
<i>Podarcis sicula sicula</i>												+
<i>Psammodromus algirus algirus</i>										+		
REPTILIA - SCINCIDAE												
<i>Chalcides ocellatus</i>	+	+	+			?		+	+	+	+	+
REPTILIA - CHAMAELEONTIDAE												
<i>Chamaeleo chamaeleon</i>	+	+										
REPTILIA - COLUBRIDAE												
<i>Macroprotodon cucullatus</i>									+			
<i>Malpolon monspessulanua insignitus</i>									+			
<i>Coluber viridiflavus carbonarius</i>	+	+	+									
<i>Elphae situla leopardina</i>	+	+	+									
<i>Coluber florulentus algirus</i>	+											
<i>Telescopus falax falax</i>	+											
<i>Coluber hippocrepis</i>												+

three siculo-maltese-pelagian *Podarcis* species have confirmed genetic variability between the three species. *P. wagleriana* appeared to be genetically related to *P. sicula raffonei* Mertens, 1952 and genetically highly differentiated from *P. filfolensis*. There appeared to be a close relationship between *P. sicula* and *P. filfolensis*, suggesting that these two species probably diverged from a common ancestor. The results of this analysis are consistent with the predictions of the time-divergence theory of variation, supporting the conclusion that directional selection is the main force eroding generic variation on small islands (Capula, 1994).

*Podarcis tilguerta* with its eleven described subspecies has a circum-tirrenian distribution on the islands of Corsica, Sardinia and the surrounding smaller islands. *P. sicula* with thirty subspecies has a wide central-north Mediterranean distribution including continental Italy, circum-tirrenian and circum-Sicilian regions. *Podarcis wagleriana* has a circum-Sicilian distribution with three subspecies inhabiting Sicily, Vulcono Island, Favignana Island, Levanzo, and Marettimo. *P. filfolensis* is limited to the islands of the Maltese-Pelagian area (Bruno, 1982). The true taxonomical status of the various subspecies of *P. tilguerta*, *P. sicula*, *P. wagleriana*, and *P. filfolensis* remains undetermined since the differentiating characters are generally based on differences in coloration.

The Pleistocene fossil record in Malta and Sicily has yielded lacertilian remains attributed to *Lacerta siculomelitensis* (Bohme & Zammit-Maempel, 1982). This Sicilian-Maltese lizard of large dimension may be the Pleistocene precursor of *Podarcis filfolensis* and *P. wagleriana*, though lizard remains of a smaller dimension have also been excavated from the region. The latter smaller species have been suggested to belong to a sympatric species possibly of the *Podarcis sicula* group (Savona-Ventura, 1985). The origin of *Podarcis sicula* stock in the Sicilian-Maltese-Pelagian region can be attributed to the Late Pleistocene link of the area with the continental mainland. The Maltese Islands area was intermittently connected to the Hyblean Plateau of south-eastern Sicily during the Pleistocene separating permanently towards the end of the Ice Age about 10,000 years ago. The isolation of the Maltese landmass resulted in the differentiation of *Podarcis sicula* (or *Lacerta siculomelitensis*) stock into *P. filfolensis*, while on Sicily it differentiated into *P. wagleriana*. The later fragmentation of the Maltese archipelago further isolated the various island populations with the development of several subspecies. The presence of *Podarcis filfolensis* on Lampione and Linosa has been attributed to later introduction through passive rafting or anthropogenic introduction (Zavattari, 1960). Geological and historic evidence has been presented for the possibility of a larger central Mediterranean landmass which included the Maltese-Pelagian area in the post-Pleistocene period (Mifsud

et al., 2000). Transportation through the accidental agency of man is unlikely. Neolithic man is known to have arrived on the Maltese Islands about 7000 years ago from mainland Sicily. He is known to have maintained trade links using primitive sea craft with Sicily, Lipari and Pantelleria (Trump, 1966). These trade links should have allowed for the reciprocal transfer of the various species of Wall Lizard. All three islands retain several forms of *Podarcis sicula*, while *P. wagleriana* is found in Sicily. There is no evidence of the presence of *P. filfolensis* in these localities, and similarly *P. sicula* and *P. wagleriana* are unknown in the Maltese region (Mertens & Wermuth, 1960; Lanza, 1973; Bruno, 1982).

The isolation of the various islands in the Maltese-Pelagian area has resulted in allopatry where, in a state of special isolation, the lizards on each island evolved differently resulting in apparently endemic forms, differing from each other in the degree of melanism (Fig. 2). Colour variations in lizards have been defined by Lanza (1972). These definition criteria, modified in the case of dorsal pattern to include completely melanic forms, can be applied to the *P. filfolensis* subtypes, particularly in the male lizard. The criteria chosen included dorsal pattern (graded 1 to 8), degree of development of dark markings under the head (graded 0-6), degree of development of the dark markings on the outer ventral plates (graded 0 to 3), and degree of development of dark markings on the inner ventral plates (graded 0 to 3). There do not appear to be any apparent differences in the external and internal morphology of the various island forms.

Several subspecies and colour forms of the Maltese-Pelagian lizards have been described. Genetic studies have confirmed that the Pelagian Island subspecies is very similar to those from the Maltese Archipelago (Capula, 1994).

**SYSTEMATICS**

*Podarcis filfolensis filfolensis* (Bedriaga, 1876)

**Distribution:** Filfolia Island, about 5 km to the south of Malta.

**Previous records:** Several naturalists noted the presence of a variety of lizard on Filfolia identifying this as *Podarcis muralis* (Adams, 1870). It was identified as a separate form and named *Lacerta filfolensis* by Bedriaga (1876). Its subspecies status was established by Mertens (1924).

**Descriptions:** Bedriaga (1876); Despott (1915); Boulenger (1921); Fejervary (1924); Savona-Ventura (1974)

**Colouration:** Dorsal pattern: heavily reticulated to completely melanic (grade 7-8); Degree of development of the dark markings under the head: heavily marked with black (grade 5-6); Degree of development of the dark markings on the outer ventral plates: moderately to very heavily marked with black (grade 3); Degree of development of the dark markings on the inner ventral plates: moderately to very heavily marked with black (grade 3).

*Podarcis filfolensis laurentiimuelleri* (Fejervary, 1924)

**Distribution:** Pelagian Islands of Lampione and Linosa about 150 km SW of Malta.

**Previous records:** The presence of a variety of lizard on the Pelagian Islands which was taxonomically related to those found on the Maltese Islands had been established by Boulenger (1921). Fejervary (1924) studied and named the subspecies as *Lacerta muralis* s.sp. *laurentii-mulleri*.

**Descriptions:** Boulenger (1921); Fejervary (1924); Lanza & Bruzzone (1960).

**Colouration:** Dorsal pattern: reticulated network sometimes very heavily marked (grade 6-7); Degree of development of the dark markings under the head: generally show large spots or marblings (grade 4-5); Degree of development of the dark markings on the outer ventral plates: generally heavily marked (grade 3); Degree of development of the dark markings on the inner ventral plates: generally heavily marked (grade 3).

**TABLE 2: Dorsal Pattern (modified after Lanza, 1972).**

TOTALLY MELANIC	RETICULATED			INTER- MEDIATE	STRIATED			
	8	7	6		5	4	3	2
								Malta
								Gozo
							Comino	
						St. Paul's Is.		
							Cominotto	
							Fungus Rock	
							Lampione	
							Linosa	
								Filfolia

TABLE 3: Dark markings under head (modified after Lanza, 1972).

VERY CLOSE MARKING	RETICULATED			SEVERAL SPOTS		ABSENT MARKINGS	
	6	5	4	3	2		1
							Malta Gozo
						Comino	
				St. Paul's Is. Cominotto			
		Fungus R.					
	Lampione						
	Linosa						
Filfolia							

***Podarcis filfolensis generalensis*** (Gulia in Despott, 1915)

**Distribution:** General's Rock (also known as Fungus Rock) about 0.1 km to the west of Gozo.

**Previous records:** The subspecies was described and illustrated by Despott (1915) who based his description on that of G. Gulia. The original description of Gulia who named the form *Lacerta generalensis* has not been traced.

**Descriptions:** Despott (1915); Fejervary (1924); Savona-Ventura (1974)

**Colouration:** Dorsal pattern: strongly reticulated (grade 6); Degree of development of the dark markings under the head: confluent and conspicuous (grade 4); Degree of development of the dark markings on the outer ventral plates: marked longitudinal series (grade 3); Degree of development of the dark markings on the inner ventral plates: moderately marked (grade 2).

***Podarcis filfolensis ? ssp.***

**Descriptions:** Savona-Ventura (1983)

**Distribution:** The islet of Cominotto and possibly associated rocks about 0.5 km off Comino

**Previous records:** The presence of the lizard on Cominotto was noted in Borg & Busuttil (1925), but the colour differences from the *maltensis* was only noted by Savona-Ventura (1983).

**Colouration:** Dorsal pattern: partial reticulation (grade 5-6); Degree of development of the dark markings under the head: moderately marked with black (grade 2-4); Degree of development of the dark markings on the outer ventral plates: generally marked with black (grade 2); Degree of development of the dark markings on the inner ventral plates: longitudinal series of dark markings (grade 2).

***Podarcis filfolensis kieselbachi*** (Fejervary, 1924)

**Distribution:** St. Paul's (also known as Selmunett) Islands, two small islets about 0.1 km NE of Malta.

**Previous records:** This was identified as a separate form by Despott (1915). This was studied in detail and named *Lacerta muralis* var. *kieselbachi* by Fejervary (1924).

**Descriptions:** Despott (1915); Fejervary (1924); Savona-Ventura (1974); Savona-Ventura (1983a)

**Colouration:** Dorsal pattern: generally striped pattern but some early reticulation can occur (grade 3-5); Degree of development of the dark markings under the head: marbled with black (grade 2-4); Degree of development of the dark markings on the outer ventral plates: small spots forming a longitudinal series (grade 1-2); Degree of development of the dark markings on the inner ventral plates: poorly marked with black (grade 1).

***Podarcis filfolensis ? maltensis***

**Distribution:** The island of Comino, situated between Malta and Gozo.

**Previous records:** The presence of the lizard on Comino had long been acknowledged (Despott, 1915), but the differences in colouration were only noted by Savona-Ventura (1983).

**Descriptions:** Savona-Ventura (1983)

**Colouration:** Dorsal pattern: reticulated pattern in some limited to the flanks (grade 2-3); Degree of development of the dark markings under the head: very lightly marked (grade 1); Degree of development of the dark markings on the outer ventral plates: very occasional small dark spots (grade 0-1); Degree of development of the dark markings on the inner ventral plates: generally white (grade 0).

***Podarcis filfolensis maltensis*** (Mertens, 1921)

**Distribution:** The islands of Malta and Gozo.

**Previous records:** Several naturalists had noted the presence of the Wall Lizard in Malta referring this to *Lacerta agilis*

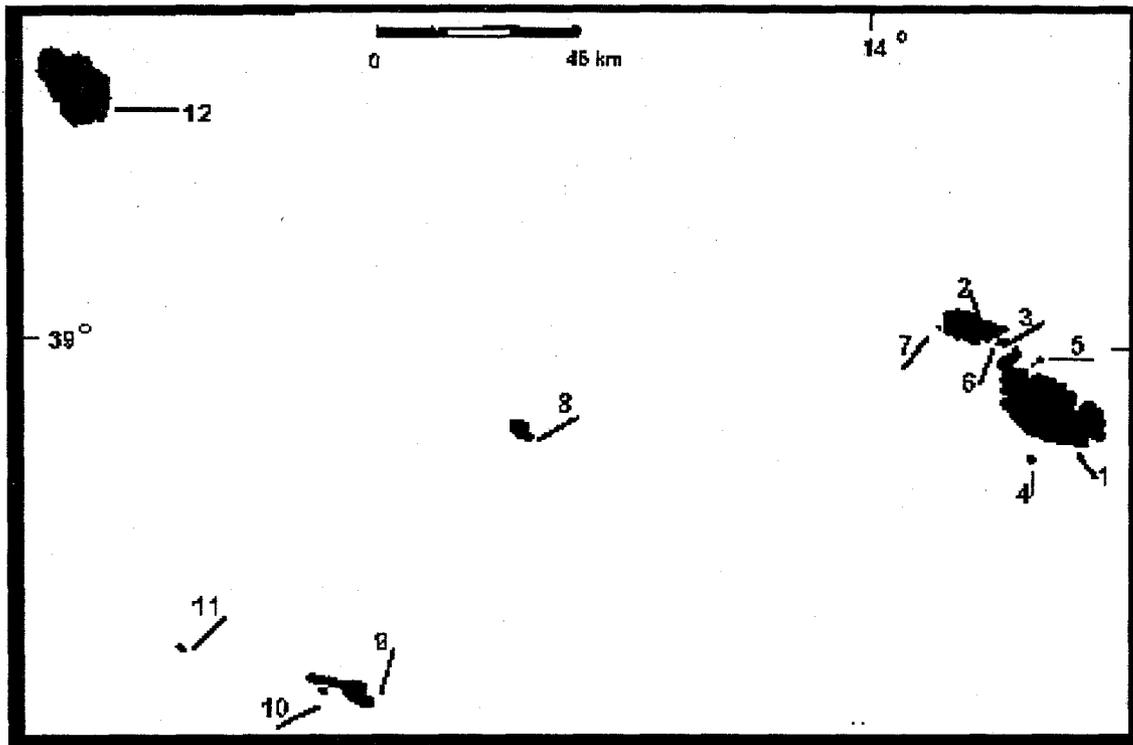


FIG. 1: Maltese-Pelagian Islands (1: Malta; 2: Gozo; 3: Comino; 4: Filfolia; 5: St. Paul's Islands; 6: Cominotto; 7: General's Rock; 8: Linosa; 9: Lampedusa; 10: Conigli Island; 11: Lampione; 12: Pantelleria)

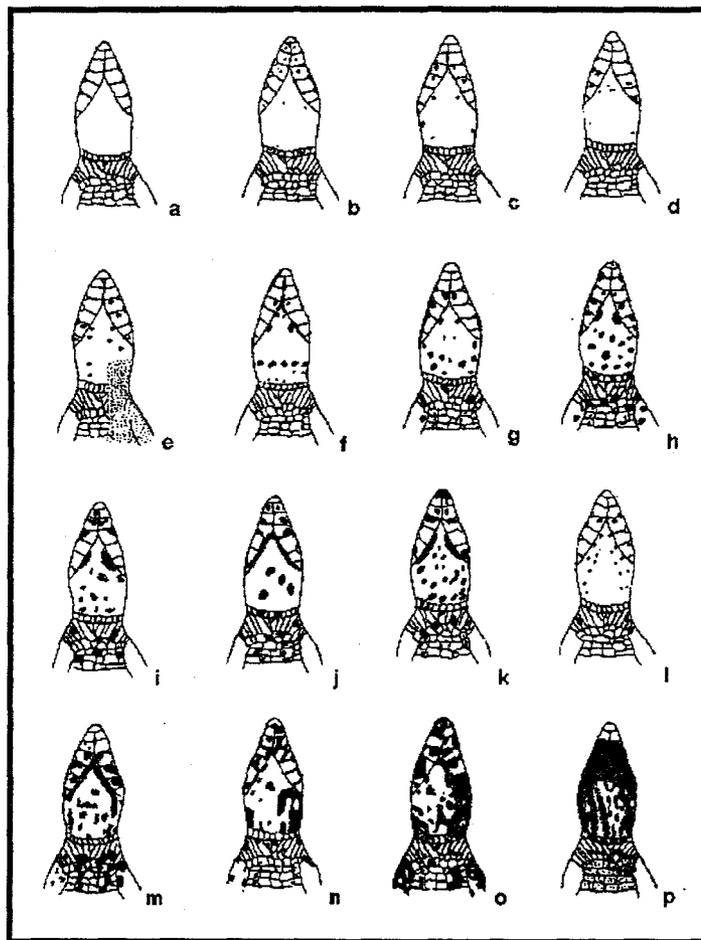


FIG. 2: Ventral views of *Podarcis filfolensis*. [a-b: *maltensis* (Malta & Gozo); c-e: ? *maltensis* (Comino); f-h: *kieselbachii*; i-l: *ssp.* ? (Cominotto); m: *generalensis*; n-o: *laurentiimuelleri*; p: *filfolensis*]

(Waring, 1843), and *Podarcis muralis* (Adams, 1870). Mertens (1921) established the taxonomical status of this subspecies and confirmed its relationship to the Filfola Lizard previously noted by Boulenger (1920). Fejervary (1924) apparently unaware of Mertens description named the subspecies *Lacerta muralis* var. *despotti*.

**Descriptions:** Boulenger (1921); Mertens (1921); Fejervary (1924); Savona-Ventura (1974)

**Colouration** [based on parameters established by Lanza (1972)]: Dorsal pattern: generally striated with very marked dorsal bands (grade 1-2); Degree of development of the dark markings under the head: only rare specimens have a few small black spots (grade 0-1); Degree of development of the dark markings on the outer ventral plates: usually unmarked with black (grade 0); Degree of development of the dark markings on the inner ventral plates: usually unmarked with black (grade 0)

## CONCLUSIONS

Degree of melanism is not a taxonomical character to be relied upon, especially in the lizards, where it has been shown to play a part in body temperature control. Coloration in lacertidae is also very variable. It would appear however that, in the Maltese-Pelagian lizards, each form inhabiting a particular island has its own range in melanism extension

which seems to be dependant on the habitat. Based on the arbitrary criteria defined by Lanza (1972) for colour pattern in the lacertidae modified to include completely melanic forms, the degree of melanism in *Podarcis filfolensis* can be graded to at least four levels - striated, intermediate, reticulated, and melanic - with marked overlap in the populations inhabiting the various islands (Table 2-3). The lizards from the Islands of Malta, Gozo and Comino apparently fall into the striated variety (ssp. *maltensis*), those for Filfola can be considered melanic (ssp. *filfolensis*), while the lizards from Lampione and Linosa fall into the reticulated variety (ssp. *laurentiimeulleri*). The lizards from St. Paul's Islands, Cominotto and Fungus Rock seem to form an intermediate group. Increased melanism appears to be particularly developed in the garrigue environment on the smaller islets. This melanic development could be attributed to food and territory competition being particularly higher in these environments. Those lizards which attain their optimum temperature earlier during the day have a higher chance of survival in these adverse ecological conditions (La Greca & Sacchi, 1957). A detailed comparative statistical study to assess the colour pattern variation of the different forms is required before the true taxonomical status of the various island forms can really be determined.

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